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On the cover: Photomicrograph of crystals of vitamin B₁. (Dennis Kunkel, University of Hawaii)

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PROTON MAGNETOMETER



The water container and biasing coil assembly of the proton vector magnetometer. Instrument measures frequency of voltage induced in coil by the protons in water. (U.S. Coast and Geodetic Survey)

PROTON RESONANCE

100 netic field sweep, Hz -

Proton resonance spectra of ethyl alcohol at 40 megahertz. The three main resonance frequencies are due to protons in the OH, CH₂, nd CH₃ groups respectively. From J. D. Roberts, Nuclear Magnetic Resonance, McGraw-Hill, 1959)

PROTON SYNCHROTRON



Schematic diagram of the principal components of a proton synchrotron

cious organisms in which the female reproductive structures

mature before the male structures. { pro'tāj-ə-nē } protointraclast [GEOL] A limestone component that resulted from a premature attempt at resedimentation while it was still in an unconsolidated and viscous or plastic state, and that never existed as a free clastic entity. { prod-o'in-tra,klast } protolith [PETR] The original, unmetamorphosed rock from

which a given metamorphic rock is formed. { 'prod-a,lith } Protomastigida [INV 200] The equivalent name for Kinetoplastida. { ,prôd-ō-ma'stij-ə-də }

protomer [BIOCHEM] One of the polypeptide chains composing an oligomeric protein. Also known as subunit. ['prod-amar I

Protomonadina [INV 200] An order of flagellates, subclass Mastigophora, with one or two flagella, including many species showing protoplasmic collars ringing the base of the flagellum. { .prod-o,man-ə'di-nə }

Protomonida [INV 200] The equivalent name for Protomonadina. (,prōd·ō'män·ə·də) protomylonite [PETR] A mylonitic rock that develops from

contact-metamorphosed rock; granulation and flowage are caused by overthrusts following the contact surfaces between the intrusion and the country rock. { ,prod-o'mria,nit }

Protomyzostomidae [INV 200] A family of parasitic polychaetes belonging to the Myzostomaria and known for three

species from Japan and the Murman Sea. | ,prod-o,mi-zə'stämə,dē } proton [PHYS] An elementary particle that is the positively

charged constituent of ordinary matter and, together with the neutron, is a building block of all atomic nuclei; its mass is approximately 938 megaelectronvolts and spin 1/2. { 'pro,tan } proton accelerator [NUCLEO] A particle accelerator which accelerates protons to high energies, as opposed to one which accelerates heavier ions or electrons. ['pro,tan ak'sel-ə,rad-

proton acid See Brönsted acid. ['pro,tan 'as-ad] protonate [CHEM] To add protons to a base by a proton source. { 'prot-an,at }

proton capture [NUC PHYS] A nuclear reaction in which a proton combines with a nucleus. [,'pro.tan 'kap cher] proton drip-line [NUC PHYS] On a chart of the nuclides, which plots proton number versus neutron number, the boundary beyond which proton-rich nuclei are unstable against proton emission. { | protan | drip | fin |

proton-electron-proton reaction [NUC PHYS] A nuclear reaction in which two protons and an electron react to form a deuteron and a neutrino; it is an important source of detectable neutrinos from the sun. Abbreviated PeP reaction. { 'pro,tan i'lek trän 'prö tän re ak shən l

protonema [BOT] A green, filamentous structure that originates from an asexual spore of mosses and some liverworts and that gives rise by budding to a mature plant. { ,prot-on'e-mo } protonephridium [INV 200] 1. A primitive excretory tube in many invertebrates. 2. The duct of a flame cell. [prod-onə'frid-e-əm l

protonic acid See Brönsted acid. { prō'tän-ik 'as-əd } proton-induced x-ray emission [ANALY CHEM] A method of elemental analysis in which the energy of the characteristic x-rays emitted when a sample is bombarded with a beam of energetic protons is used to identify the elements present in the sample. Abbreviated PIXE. ['pro,tän in,düst 'eks,rä i,mishən l

protonium [ATOM PHYS] A bound state of a proton and an antiproton. { pro'to-ne-əm }

proton magnetometer [ELECTROMAG] A highly sensitive magnetometer which measures the frequency of the proton resonance in ordinary water. { 'pro,tan ,mag-nə'tam-əd-ər } proton microscope [ELECTR] A microscope that is similar to the electron microscope but uses protons instead of electrons as the charged particles. ['pro,tan 'mī krə,skop]

proton moment [NUC PHYS] The magnetic dipole moment of the proton, a physical constant equal to $(1.41062 \pm 0.00001) \times 10^{-23}$ erg per gauss. { 'pro,tan,mo-mont} proton number See atomic number. { 'pro,tan ,nom-bor } proton-proton chain [NUC PHYS] An energy-releasing nuclear reaction chain which is believed to be of major importance

in energy production in hydrogen-rich stars. Also known as deuterium cycle. { 'pro,tan 'pro,tan ,chan } proton-proton reaction [NUC PHYS] The initiating reaction

in the proton-proton chain, in which t a deuteron, a positron, and a neutrino.

{ 'pro,tan 'pro,tan re,ak-shon } proton-proton scattering [NUC PHYS with another proton, usually the nucl ('prö tän 'prö tän 'skad-ər in)

proton-recoil counter [NUCLEO] fast neutrons. { 'prō,tän 'rē,kóil ,kaŭ proton resonance [SPECT] A pheno absorb energy from an alternating mag acteristic frequencies when they are magnetic field; this phenomenon is u resonance quantitative analysis techniproton-rich nucleus [NUC PHYS] At

the ratio of proton number to neutror than that of nuclei found in nature, 1 proton scattering microscope [soli in which protons produced in a cold-c celerated and focused on a crystal in a v reflected from the crystal strike a flux visual and photographable display that of the target crystal. { 'pro,tan | skad-proton stability constant [PHYS CHE dissociation constant of a weak base

stə bil-əd-ē ,kän-stənt proton storage ring [NUCLEO] Ama nets and vacuum chambers in which be tons can be stored. { 'pro,tan 'stor-ij, proton synchrotron [NUCLEO] A protons in circular orbits in a time-vi which the orbit radius is kept con kra.trän l

proton vector magnetometer [ELEC ton magnetometer with a system of au measurement of horizontal intensity or as total intensity. { 'protan 'vek-tor, protophilic [CHEM] Strongly basic. protophloem [BOT] The initial prin from the procambium. | prod ə flo ə Protophyta [BOT] A division of the p to one system of classification, set up the blue-green algae, and the viruses. protoplasm [CYTOL] The colloidal composes the living material of a cell. protoplast [CYTOL] The living portion a unit, includes the cytoplasm, the r membrane. ['prod-a plast] protoplast fusion [GEN] A techniq

plasts are joined or a protoplast is join another cell in order to accomplish { 'prod-a,plast ,fyü-zhan } protopodite [INV ZOO] The basal : limb bearing an endopodite or exopo-

extremity. (pro tap o, dit) Protopteridales [PALEOBOT] An ex Polypodiatae. { prod-o,ter-o'da-lez } protoquartzite [PETR] A well-sorte mediate in composition between su quartzite, consisting of 75-95% quartz 15% detrital clay matrix and 5-25% un there is a greater abundance of rock grains. Also known as quartzose si

ő'kwórt.sít l protore [MIN ENG] 1. A primary through enrichment, can be modified to 2. A deposit which could become ec technological change occurred or ('prod,or)

Protosireninae [PALEON] An extinc mammals in the family Dugongidae for of Egypt. { prod-o-sa ren-a,ne } Protospondyll [VERT ZOO] An equ onotiformes. { prod o'span da,li } protostar [ASTRON] A flattened mahypothesized to form into a star. | 'pi

protostele [BOT] A stele consisting surrounded by phloem. { 'prod-a,stel Protostomia [INV ZOO] A major divi